IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:	)	
	)	Confirmation No.: 2091
George C. Carver, et al.	)	
	)	Group Art Unit: 3663
Serial No.: 10/795,879	)	
	)	Examiner: Mondt, Johannes P.
Filed: March 8, 2004	)	
	)	Docket No.: 061404-1100
For: Container and Method for Storing or Transporting Spent Nuclear Fuel	)	

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed June 1, 2010 responding to the non-final Office Action mailed March 1, 2010.

REAL PARTY IN INTEREST

The real party in interest of the instant application is NAC International Inc., having its principal place of business at 3930 E. Jones Bridge Road, Suite 200, Norcross, GA 30092.

I. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

II. STATUS OF THE CLAIMS

Claims 1, 3-10, 13-34, 48-51, 53-58, and 69-71 are pending in this application. Claims 2, 11-12, 35-47, 52, and 59-68 were cancelled during prosecution. Claims 1, 3-10, 13-34, 48-51, 53-58, and 69-71 were rejected by the non-final Office Action, and are the subject of this appeal.

III. STATUS OF AMENDMENTS

There have been no claim amendments made after the non-final Office Action, and all amendments made before the non-final Office Action have been entered. The claim listing in section VII (CLAIMS – APPENDIX) represents the present state of the claims.

IV. SUMMARY OF THE CLAIMED SUBJECT MATTER

Embodiments of the claimed subject matter are summarized below with reference numbers and references to the written description ("specification") and drawings. The subject matter described below appears in the original disclosure at least where indicated, and may further appear in other places within the original disclosure. Embodiments according to independent claim 1 involve a container for storing or transporting spent nuclear fuel (FIG. 1), the container comprising: a plurality of tubes that receive spent nuclear fuel assemblies (FIG. 1: 2, 4, 6, 7; ¶ 24), each tube having four sidewalls and four corners defining a rectangular cross section (FIG. 4: 2, 4, 6, 7), the four sidewalls forming a continuous inner sidewall (FIGS. 5 and 8: 2, 4); an attachment means for attaching respective pairs of a plurality of corners of the tubes to each other (FIG. 2: 8, 12, 16, 18; FIG. 6: 40; ¶ 28 and ¶ 44), at least one corner of a first one of the tubes engaging another corner of a second one of the tubes (FIG. 6; ¶ 44), the attachment means comprising a plurality of recesses in respective ones of the corners (FIG. 6: 32, 34; ¶ 44) and a plurality of rods that are positioned in the recesses between respective engaged ones of the corners (FIG. 6: 8, 12, 20, 22; ¶ 44), wherein each of the rods is a cylinder having a single cylindrical wall (¶ 25, lines 1-4), the cylindrical wall of each of the rods contacting at least two recesses associated with at least two of the tubes (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10); each engaged corner of the first and second ones of the tubes being formed from an intersection of a first sidewall and a second sidewall, the first and second side walls being normal to each other (FIG. 5: 8, 12, 20, 22); the first sidewall of the first one of the tubes and the first sidewall of the second one of the tubes being in substantial alignment; and the

second sidewall of the first one of the tubes and the second sidewall of the second one of the tubes being in substantial alignment (FIGS. 6 and 7).

Embodiments according to independent claim 8 involve a container for storing or transporting spent nuclear fuel (FIG. 1), the container comprising: a plurality of tubes that receive spent nuclear fuel (FIG. 1: 2, 4, 6, 7; ¶ 24), each of the plurality of tubes having a continuous inner sidewall (FIGS. 5 and 8: 2, 4); a plurality of first rods being mounted at a point where each respective one of the tubes abuts against another one of the tubes (FIG. 2), each of said first rods having an opening (FIG. 5: 8, 12, 20, 22), wherein each respective one of the first rods is mounted in a recess of both a first one of the tubes and a second one of the tubes (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10), wherein each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting the recesses of both the first and second ones of the tubes (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10); at least one pin (FIG. 6: 40); wherein the openings of respective ones of the first rods mounted on the first one of the tubes are substantially aligned with the openings of respective ones of the first rods mounted on the second one of the tubes (FIGS. 6 and 7); the at least one pin extends through the aligned ones of the openings of the first rods, thereby linking respective ones of the tubes together (FIG. 6: 40; FIG. 7: 50; ¶ 44; ¶ 45); and wherein each one of the respective ones of the first rods mate with a corresponding recess in the second one of the tubes when the openings of the respective ones of the first rods mounted in the recesses in the first one of the tubes are substantially aligned with the openings of the respective ones of the first rods mounted on the second one of the tubes (FIG. 5; ¶ 37).

Embodiments according to independent claim 18 involve a container for storing spent nuclear fuel (FIG. 1), the container comprising a plurality of tubes that receive spent nuclear fuel assemblies (FIG. 1: 2, 4, 6, 7; ¶ 24), each of the tubes having a plurality of recesses (FIG. 5: 32, 34) and a continuous inner sidewall (FIGS. 5 and 8: 2, 4); a plurality of first rods being mounted in respective ones of the recesses (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10); and wherein at least one

first rod mounted on a respective one of the tubes is attached to at least one of the first rods mounted on at least one second one of the tubes, thereby linking the respective one of the tubes and the at least one second one of the tubes together (FIG. 6: 40; FIG. 7: 50; ¶ 44; ¶ 45), wherein each of the first rods is seated in both a first one of the recesses of the respective one of the tubes and a second one of the recesses of the at least one second one of the tubes (FIG. 5; ¶ 37), and each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting both the first and second ones of the recesses (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10).

Embodiments of independent claim 28 involve a container for storing or transporting spent nuclear fuel (FIG. 1), the container comprising: a plurality of tubes that receive spent nuclear fuel rods (FIG. 1: 2, 4, 6, 7; ¶ 24), each of the tubes having four sidewalls forming a continuous inner sidewall (FIGS. 5 and 8: 2, 4) and four corners defining a rectangular cross section (FIG. 4: 2, 4, 6, 7), each of the tubes having a plurality of recesses along at least one of the corners (FIG. 5: 32, 34) and a plurality of flat load bearing surfaces along at least one of the corners (FIG. 8: 60, 62); a plurality of first rods being mounted in the recesses of the tubes (FIG. 2), wherein respective pairs of the first rods are attached to each other, thereby linking the tubes together (FIG. 6: 40; FIG. 7: 50; ¶ 44; ¶ 45), and each of the first rods is seated in the recesses of two of the tubes (FIG. 5; ¶ 37), wherein each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting the recesses of two of the tubes (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10); and wherein the tubes are linked to each other at the corners such that the flat load bearing surfaces on respective pairs of the tubes abut against each other (FIG. 8: 60, 62; ¶ 47-48).

Embodiments of independent claim 48 involve an apparatus for the storage and transport of spent nuclear fuel (FIG. 1), comprising: an array of tubes having a continuous inner sidewall (FIGS. 5 and 8: 2, 4); a container, wherein the array of tubes are disposed in the container and the array of tubes contacts at least one side wall of the container (FIG. 1: 10); a

plurality of couplings between adjacent pairs of the tubes (FIG. 2: 8, 12, 16, 18; FIG. 6: 40; ¶ 28 and ¶ 44), wherein each of the couplings comprises: a first rod disposed on a first one of the tubes (FIG. 5: 8); a second rod attached to a second one of the tubes (FIG. 5: 20); the first rod being disposed in recesses formed in the outer surfaces of both the first and second ones of the tubes (FIG. 5: 8, 32, 34), and the second rod being disposed in the recesses formed in the outer surfaces of both the first and second ones of the tubes (FIG. 5: 20, 32, 34), wherein each of the first and second rods comprises at least one outer wall, the at least one outer wall of each of the first and second rods contacting the recesses formed in the outer surfaces of both the first and second ones of the tubes (FIG. 5: 8, 12, 32; ¶ 26; lines 9-10); the first and second rods each having an opening along a length of the first and second rods (FIG. 6: 8, 12; ¶ 44); and a pin extending through the openings of the first and second rods (FIG. 6: 40; ¶ 44); and wherein a horizontal bearing load applied to the array of tubes is transferred through the tubes and the couplings to the at least one side wall of the container (¶ 46 – ¶ 48).

Embodiments of independent claim 69 involve an apparatus for the dry storage and transport of spent nuclear fuel (FIG. 1; ¶ 23), comprising: a plurality of tubes disposed in a container (FIG. 1: 2, 4, 6, 7; ¶ 24), each of the plurality of tubes having a continuous inner sidewall (FIGS. 5 and 8: 2, 4); a plurality of recesses, each recess being formed in a wall of a respective one of the tubes (FIG. 5: 32, 34, ¶ 37); a plurality of rods, each rod being disposed within a first one of the recesses formed in a first one of the tubes (FIG. 5: 8, 20, 32, 34); each of the rods has an outer wall that contacts a second one of recesses formed in a second one of the tubes when the tubes are assembled in the container (FIG. 5: 8, 20, 32, 34); and each of the recesses being configured to receive the rod from a lateral direction with respect to a longitudinal length of a respective one of the tubes to facilitate a horizontal assembly of the tubes to each other (FIG. 5: 8, 20, 32, 34; ¶ 37).

V. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are to be reviewed on appeal.

A. The rejection of claims 1, 3-10, 13-34, 48-50, 53-55, 57-58 and 69-71 under 35 U.S.C. § 103, as allegedly unpatentable over Machado, et al. ("*Machado*," U.S. Patent No. 5,245,641) in view of Minshall, et al. ("*Minshall*," WO 00/72326).

VI. ARGUMENT

A. Rejection of claims 1, 3-10, 13-34, 48-50, 53-55, 57-58 and 69-71 under 35 U.S.C. § 103

The Office Action rejected claims 1, 3-10, 13-34, 48-50, 53-55, 57-58 and 69-71 under 35 U.S.C. § 103 as allegedly being unpatentable over *Machado* in view of *Minshall*. Appellant has previously filed an appeal in the instant application and prosecution was reopened by the Examiner. The non-final Office Action from which this Appeal has been filed cites prior art that has previously been addressed by the Appellant in response to an Office Action issued by the USPTO. *See* Appellant's Response to Office Action of December 10, 2008. In that previous response, Appellant substantively addressed the inadequacies of the *Minshall* reference, which caused the Examiner to create a new ground of rejection based on different prior art. The Examiner is now once again attempting to apply this reference to the claims of the application. Accordingly, as Appellant feels it has yet to be afforded a proper examination of the application and that the Examiner is attempting to cause Appellant to run in circles in an effort to obtain one, this appeal is respectfully lodged despite the fact that the most recent Office Action is non-final.

1. Claims 1, 3-6 and 7 are allowable

Accordingly, Appellant respectfully requests that this rejection be overturned. Claim 1, with emphasis added, recites:

1. A container for storing or transporting spent nuclear fuel, the container comprising:

a plurality of tubes that receive spent nuclear fuel assemblies, each tube having four sidewalls and four corners defining a rectangular cross section, the four sidewalls forming a continuous inner sidewall;

an attachment means for attaching respective pairs of a plurality of corners of the tubes to each other, at least one corner of a first one of the tubes engaging another corner of a second one of the tubes, ***the attachment means comprising a plurality of recesses in respective ones of the corners and a plurality of rods that are positioned in the recesses between respective engaged ones of the corners,*** wherein each of the rods is a cylinder having a single cylindrical wall, the cylindrical wall of each of the rods contacting at least two recesses associated with at least two of the tubes;

each engaged corner of the first and second ones of the tubes being formed from an intersection of a first sidewall and a second sidewall, the first and second side walls being normal to each other;

the first sidewall of the first one of the tubes and the first sidewall of the second one of the tubes being in substantial alignment; and

the second sidewall of the first one of the tubes and the second sidewall of the second one of the tubes being in substantial alignment.

Appellant submits that the cited art fails to disclose, teach, or suggest each element of claim 1. In particular, the cited art fails disclose a plurality of tubes that receive spent nuclear fuel assemblies, where each tube has four sidewalls and four corners defining a rectangular cross section and ***the four sidewalls form a continuous inner sidewall***. In fact, Appellant submits that the cited art ***teaches away*** from this element of the claim. With regard to this element of the claim, the Office Action only alleges the following with respect to this element of the claim on page 8:

> *Machado et al teach* a container for storing or transporting spent nuclear fuel, the container comprising:
>
> a plurality of tubes C ((Figure 4 and col. 3, l. 64 – col. 4, l. 2) that receive spent nuclear fuel assemblies, each tube 33 having four sidewalls 44, 48, 50, and 52 (loc.cit.) or walls 34/54 (col. 3, l. 50+ and col. 4, l. 9+), and four corners defining a rectangular cross section (Fig. 4), the four sidewalls forming a continuous inner sidewall (Fig. 4)

Appellant respectfully disagrees and submits that the reference explicitly teaches away from claim 1. More specifically, the **Abstract**, with emphasis added, clearly states:

> ***The cells are formed of L-shaped sections*** having walls which support neutron absorbing material, and the walls of one cell are common to the adjacent cells.

Further, column 3 of the reference states:

> ***Each inner cell is made up of <u>two</u> L-shaped sections 34***, and to provide simplicity in the manufacturing operations, neutron absorbing material is attached to the outer side of the walls of both L-shaped sections. To form a complete cell, one of the two thusly formed manufacturing sections 34 is placed in contact with, or in substantial contact with the corresponding longitudinal edges on the other sections.

Accordingly, Appellant submits that the *Machado* reference teaches away from a continuous inner sidewall as recited in claim 1 because the reference explicitly states that the inner cells shown in FIG. 4 are constructed from independent L-shaped sections. Therefore, a person of ordinary skill in the art would not arrive at a continuous inner sidewall as recited in claim 1 with the benefit of *Machado*, because it discloses cells constructed from multiple independent sections.

Appellant also submits that the *Machado* reference fails to show or suggest an ***attachment means comprising a plurality of recesses in respective ones of the corners and a plurality of rods that are positioned in the recesses between respective engaged ones of the corners***. The Office Action alleges on page 8 that the "interruption of 54 at the corners" in Figures 5 of the reference discloses the recesses as recited in claim 1. Appellant respectfully disagrees and submits that the reference fails to disclose any recesses as recited in the claim 1. Accordingly, Appellant has reproduced the cited figure from the *Machado* reference below:

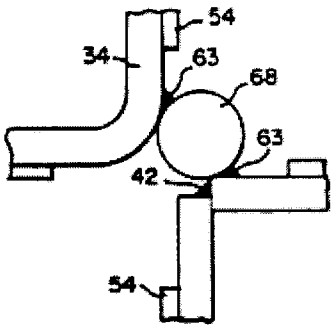
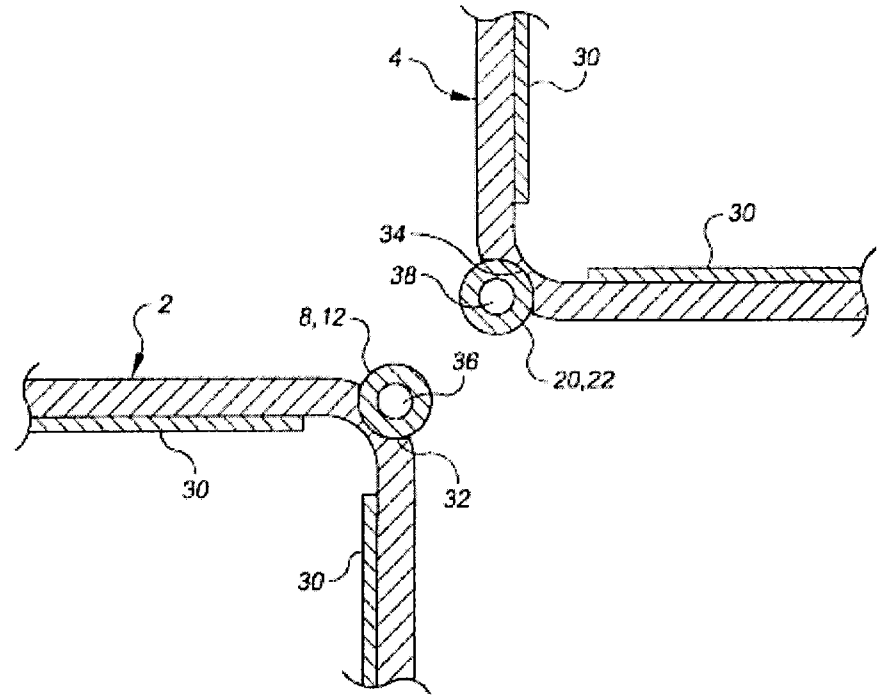


FIG.5.

Accordingly, the cited portion of the *Machado* reference can clearly be distinguished from the recesses of claim 1. Appellant has reproduced an embodiment of claim 1 as disclosed in Appellant's specification below, which illustrates recesses 32 as recited in the claim:

FIG.5



The Examiner is advancing the position that a "recess" as recited in claim 1 is the free space that exists between element 54 of Figure 5 of the *Machado* reference. Appellant submits that the Examiner is taking an unreasonably broad construction of the term "recesses" as recited in claim 1. If the Examiner's interpretation of the word is to be accepted, a "recess" can include any space between any two surfaces. Appellant submits that this interpretation is without reason, and that the application of the *Machado* reference in this regard is flawed.

The Office Action admits that *Machado* fails to disclose "at least one corner of a first one of the tubes engaging another corner of a second one of the tubes," "each engaging corner of the first and second ones of the tubes being formed from an intersection of a first sidewall and a second sidewall." The Office Action then alleges beginning on page 9 that *Mishall* discloses these elements. Appellant respectfully disagrees and submits that *Minshall* teaches away from the claimed invention. In particular, the *Minshall* reference discloses a plurality of plates (5a, 5b, 6a, 6b, *etc.*) arranged in a perpendicular arrangement that form a cavity therein. Accordingly, the reference fails to disclose a tube structure in which it is possible to have a continuous inner sidewall as disclosed in the pending claims. *See* at least reference numerals 2 and 4, FIG. 5 of the instant application. In contrast, the *Minshall* reference does not disclose a tube structure of any kind that has a continuous inner sidewall. Instead, it discloses a collection of horizontal wall plates.

In addition, *Minshall* fails to disclose rods having openings that are recessed into the sidewall of a tube structure. Instead, the reference discloses multiple plates arranged perpendicularly that have interlocking tabs ***extending from each end.*** In contrast, the claimed invention claims rods having openings that are mounted in a recess of a tube structure. Because of the recesses ***in the exterior sidewall*** that are employed in the claimed invention, spent nuclear fuel in adjacent tubes can be stored in closer proximity. Therefore, employment of rods ***in recesses*** results in increased storage capacity. In addition, tubes of the design of the claimed invention have a continuous interior sidewall as opposed to the storage compartment made of individual wall plates arranged perpendicularly.

Appellants also submit that a design according to the claimed invention yields greater flexibility in terms of the cross sectional shapes that can be adopted for tubes in which nuclear fuel assemblies are disposed. As noted in paragraph 24 of the instant application, the elongated tubes employed by the claimed invention can be arranged to form a square-like or rectangular-like cross section. In addition, the tubes can be arranged to form other cross-

sectional shapes, e.g., circle, triangle, heptagon, hexagon and octagon. Appellants submit that the horizontal wall plates that perpendicularly arranged as in *Minshall* fail to yield a similar result, as there does not appear to be any other way to arrange the plates to form any other cross-sectional shape other than a rectangular-like or square-like shape. In addition, Appellants respectfully assert that the combination of the *Machado* reference with *Minshall* is improper, as the wall plates employed by *Minshall* would be incompatible with the L-shaped sections employed to form a cell in the *Machado* reference. In other words, the connector tabs extending from the horizontal wall plates of *Minshall* would be incompatible with the L-shaped sections in the *Machado* reference.

The Office Action alleges the following on page 10:

> "the claim is obvious as nothing more than the substitution of one known element for another to yield predictable results for the integrity of the container by reducing the adverse affects of welds and improved load distribution, as taught by Minshall et al and as also known by any of ordinary skill in the art of connectors. See MPEP 2141, section III, rationale B."

The Office Action additionally alleges that Appellants "do not disclose criticality in the manner in which the tubes are joined other than what is comprised in those advantages specifically disclosed by Minshall et al and discussed overhead, and other than through a mere hint at complying with NRC regulations, which is an obvious pre-condition for applying the invention at least within the USA, no specific other advantage or improvement of the invention as disclosed is indicated in the specification..." (Emphasis added).

Appellant respectfully disagrees. During prosecution of the instant application, far beyond merely "hinting at", Appellant submitted numerous declarations under 37 CFR 1.132 outlining the various advantages of a design consistent with the claims of the application that yield advantages and improvements with respect a design of an embodiment of claim 1 and with respect to complying with NRC regulations. The above statement by the Examiner in the Office Action indicates that, inexplicably, all of these declarations were ***ignored*** by the Examiner during examination of this application. In item 1 of the Office Action, the Examiner notes that

another examiner has assumed responsibility for the examination of the application, which the Examiner apparently believes is a good enough reason for the voluminous file history and the materials submitted by the Appellant (at great expense) to the USPTO to be ignored. For the benefit of the Board, however, Appellant has attached hereto as Exhibits A-C the Declarations of Charles Pennington, which outline the various advantages of a design consistent with claim 1.

It is telling that the Examiner's explicitly stated rationale, quoted above, for combining the references and rejecting the claims under 35 U.S.C. § 103 fails to note the various advantages outlined in these declarations. As noted above, the Examiner argues that a person of ordinary skill in the art would combine the cited art and ***allegedly*** arrive at the claimed invention for the purposes of reducing the adverse affects of welds as well as improved load distribution. In this regard, the Examiner's failure to review the Declarations submitted under 37 CFR 1.132 is actually helpful in that it demonstrates to the Board that a design according to claim 1 is a departure from the prior art, as the Examiner ***fails*** to recognize that a design according to claim 1 (*e.g.,* incorporating the rods and recesses design of claim 1) results in an increased storage capacity of the device when compared to prior art devices. *See e.g.,* Declaration of Charles Pennington, item 8.

Therefore, for at least the above reasons, we submit that the pending claims are allowable, contrary to the assertions of the Office Action. Accordingly, in view of the foregoing, Appellants assert that the rejection of claim 1 is improper and must be overturned. With respect to claim 5, Appellants assert that the rejection should be overturned, as the Office Action fails to give any basis for rejecting the claim. In addition, Appellants assert that the rejection of claims 3-6 and 7 must be overturned as depending from claim 1.

Claim 7 recites:

> 7. The container of claim 1, wherein the plurality of tubes includes a plurality of flat load bearing surfaces at the corners of respective ones of the

tubes, the flat load bearing surfaces on the first one of the tubes engaging the plurality of flat bearing surfaces on the second one of the tubes.

With respect to claim 7, the Office Action cites "main surfaces 34" as well as column 3, lines 28+ as allegedly disclosing the elements of this claim. Appellant respectfully disagrees. The cited portions of the specification of the *Machado* reference explain that reference numeral 34 refers to L-shaped sections. Additionally, FIG. 5 of *Machado* reveals that reference numeral 34 does not include a ***plurality of*** flat load bearing surfaces ***at the corners*** as is recited in claim 7. The cited portion of the *Machado* specification also fails to include any discussion of the load bearing nature of these L-shaped sections cited by the Office Action. Accordingly, Appellant submits that the rejection of claim 7 should be overturned for at least this additional reason.

2. Claims 8-10 and 13-17 are allowable

With regard to claim 8, the Office Action states that the "obviousness argument as set forth for claim 1 holds verbatim also for this independent claim for the same reasons, herewith included by reference in its entirety." Accordingly, Appellants reiterate and re-allege the statements made above in reference to claims 1 and 3-7, and submit that the rejection of claims 8-10 and 13-17 should be overturned for at least the same reasons, as none of the cited art shows or suggests a continuous inner sidewall or rods and recesses as recited in the instant claims.

3. Claims 18-27 are allowable

With regard to claim 18, the Office Action states that the "obviousness argument as set forth for claim 1 holds verbatim also for this independent claim for the same reasons, herewith included by reference in its entirety." Accordingly, Appellants reiterate and re-allege the statements made above in reference to claims 1 and 3-7, and submit that the rejection of claims

19-27 should be overturned for at least the same reasons, as none of the cited art shows or suggests a continuous inner sidewall or rods and recesses as recited in the instant claims.

4. Claims 18-27 are allowable

With regard to claim 28, the Office Action states that the "obviousness argument as set forth for claim 1 holds verbatim also for this independent claim for the same reasons, herewith included by reference in its entirety." Accordingly, Appellants reiterate and re-allege the statements made above in reference to claims 1 and 3-7, and submit that the rejection of claims 29-34 should be overturned for at least the same reasons, as none of the cited art shows or suggests a continuous inner sidewall or rods and recesses as recited in the instant claims.

5. Claims 48-51 and 53-58 are allowable

With regard to claim 48, the Office Action states that the "obviousness argument as set forth for claim 1 holds verbatim also for this independent claim for the same reasons, herewith included by reference in its entirety." Accordingly, Appellants reiterate and re-allege the statements made above in reference to claims 1 and 3-7, and submit that the rejection of claims 49-51 and 53-58 should be overturned for at least the same reasons, as none of the cited art shows or suggests a continuous inner sidewall or rods and recesses as recited in the instant claims.

6. Claims 69-71 are allowable

With regard to claim 69, the Office Action states that the "obviousness argument as set forth for claim 1 holds verbatim also for this independent claim for the same reasons, herewith included by reference in its entirety." Accordingly, Appellants reiterate and re-allege the statements made above in reference to claims 1 and 3-7, and submit that the rejection of claims

70-71 should be overturned for at least the same reasons, as none of the cited art shows or suggests a continuous inner sidewall or rods and recesses as recited in the instant claims.

B. Objections to the Drawings

The non-final Office Action in the instant application lodges an objection to the drawings that, although drawings objections are not an appealable matter, Appellant wishes to address briefly for the record. In the previous final Office Action mailed June 25, 2009, rejections under 35 U.S.C. § 112 were lodged, and the basis these rejections were various drawings objections. These were the only rejections maintained by the final Office Action, which were appealed in an Appeal Brief filed November 25, 2009. These misguided drawings objections were addressed in detail in the previous Appeal Brief. In reopening prosecution and issuing ***another*** Office Action in the instant application, which has led to the current Appeal, the Examiner curiously ***maintains*** these drawings objections, but ***withdraws*** the rejections under 35 U.S.C. § 112. This action appears on its face to be an attempt by the Examiner, after reviewing Appellant's arguments in its Appeal brief, to frustrate or remove Appellant's ability to seek review of the rejections under 35 U.S.C. § 112 before the Board. It is simply logically inconsistent that the Examiner would lodge these objections to the drawings that form the basis for rejections under 35 U.S.C. § 112, and then, in the subsequent Office Action, withdraw the rejection under 112 but still maintain the identical objections to the drawings. Accordingly, Appellant respectfully requests that the Examiner, upon disposition of this appeal, withdraw the drawings objections.

CONCLUSION

For at least the reasons discussed above, Appellant respectfully requests that the Examiner's rejection of claims 1, 3-10, 13-34, 48-51, 53-58, and 69-71 be overturned by the Board. In addition to the claims listed in Section VII (CLAIMS – APPENDIX), Section VIII (EVIDENCE – APPENDIX) included herein indicates that Exhibits A, B, and C are relied upon by this brief. Section IX (RELATED PROCEEDINGS – APPENDIX) included herein indicates that there are no related proceedings.

Respectfully submitted,

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VII. CLAIMS – APPENDIX

1. A container for storing or transporting spent nuclear fuel, the container comprising:

a plurality of tubes that receive spent nuclear fuel assemblies, each tube having four sidewalls and four corners defining a rectangular cross section, the four sidewalls forming a continuous inner sidewall;

an attachment means for attaching respective pairs of a plurality of corners of the tubes to each other, at least one corner of a first one of the tubes engaging another corner of a second one of the tubes, the attachment means comprising a plurality of recesses in respective ones of the corners and a plurality of rods that are positioned in the recesses between respective engaged ones of the corners, wherein each of the rods is a cylinder having a single cylindrical wall, the cylindrical wall of each of the rods contacting at least two recesses associated with at least two of the tubes;

each engaged corner of the first and second ones of the tubes being formed from an intersection of a first sidewall and a second sidewall, the first and second side walls being normal to each other;

the first sidewall of the first one of the tubes and the first sidewall of the second one of the tubes being in substantial alignment; and

the second sidewall of the first one of the tubes and the second sidewall of the second one of the tubes being in substantial alignment.

2. (Canceled)

3. The container of claim 1, wherein each of the first rods has an opening and the attachment means further comprises at least one pin, wherein the openings of at least one

respective pair of the first rods mounted in respective ones of the recesses of the first and second ones of the tubes are axially aligned, wherein the at least one pin is inserted through the openings of the at least one respective pair of the first rods.

4. The container of claim 1, wherein the rods further comprise at least one first rod and at least one second rod, the at least one first rod being mounted in a corresponding at least one of the recesses of the first one of the tubes and the at least one second rod being mounted in a corresponding at least one of the recesses of the second one of the tubes, the at least one first rod engaging a respective one of the recesses of the second one of the tubes and the at least one second rod engaging a respective one of the recesses of the first one of the tubes when the first side wall of the first one of the tubes and the first side wall of the second one of the tubes are in substantial alignment, and the second side wall of the first one of the tubes and the second side wall of the second one of the tubes are in substantial alignment.

5. The container of claim 4, further comprising a first and a second set of the tubes, wherein the second rods are mounted on the tubes within the first set, wherein each of the second rods of the first set of tubes engages a respective one of the tubes in the second set of tubes.

6. The container of claim 1, wherein the plurality of tubes is arranged in the alternating pattern such that the placement of a four-tube array linked at the corners of the tubes creates a developed cell.

7. The container of claim 1, wherein the plurality of tubes includes a plurality of flat load bearing surfaces at the corners of respective ones of the tubes, the flat load bearing

surfaces on the first one of the tubes engaging the plurality of flat bearing surfaces on the second one of the tubes.

8. A container for storing or transporting spent nuclear fuel, the container comprising:

a plurality of tubes that receive spent nuclear fuel, each of the plurality of tubes having a continuous inner sidewall;

a plurality of first rods being mounted at a point where each respective one of the tubes abuts against another one of the tubes, each of said first rods having an opening, wherein each respective one of the first rods is mounted in a recess of both a first one of the tubes and a second one of the tubes, wherein each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting the recesses of both the first and second ones of the tubes;

at least one pin;

wherein the openings of respective ones of the first rods mounted on the first one of the tubes are substantially aligned with the openings of respective ones of the first rods mounted on the second one of the tubes;

the at least one pin extends through the aligned ones of the openings of the first rods, thereby linking respective ones of the tubes together; and

wherein each one of the respective ones of the first rods mate with a corresponding recess in the second one of the tubes when the openings of the respective ones of the first rods mounted in the recesses in the first one of the tubes are substantially aligned with the openings of the respective ones of the first rods mounted on the second one of the tubes.

9. The container of claim 8, wherein the at least one pin is captured by one of the first rods.

10. The container of claim 8, wherein the at least one pin comprises a head portion and a body portion, the body portion extending through the openings of the aligned ones of the first rods and the head portion resting against one of the first rods.

11. (Canceled)

12. (Canceled)

13. The container of claim 8, further comprising a first set of tubes upon which the second rods are mounted, and a second set of tubes without second rods mounted thereon, the second rods of the first set of tubes engaging the second set of tubes when the tubes are linked together.

14. The container of claim 8, wherein each of the tubes has four sidewalls and four corners defining a rectangular cross section, the plurality of recesses being formed at the corners of the tubes.

15. The container of claim 14, wherein:

the tubes are arranged in an alternating pattern; and

the tubes are linked together at the corners, wherein a sidewall of a first one of the tubes is in substantial alignment with a sidewall of a second one of the tubes.

16. The container of claim 15, wherein the tubes are arranged in the alternating pattern such that the placement of a four-tube array linked at the corners of the tubes creates a developed cell.

17. The container of claim 15, wherein respective ones of the tubes includes a plurality of flat load bearing surfaces, the flat load bearing surfaces being located at the corners of the tubes, the flat load bearing surfaces on a respective one of the tubes engaging the flat load bearing surfaces on another one of the tubes.

18. A container for storing spent nuclear fuel, the container comprising:

a plurality of tubes that receive spent nuclear fuel assemblies, each of the tubes having a plurality of recesses and a continuous inner sidewall;

a plurality of first rods being mounted in respective ones of the recesses; and

wherein at least one first rod mounted on a respective one of the tubes is attached to at least one of the first rods mounted on at least one second one of the tubes, thereby linking the respective one of the tubes and the at least one second one of the tubes together, wherein each of the first rods is seated in both a first one of the recesses of the respective one of the tubes and a second one of the recesses of the at least one second one of the tubes, and each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting both the first and second ones of the recesses.

19. The container of claim 18, wherein each of the first rods has an opening and respective pairs of the first rods are attached to each other by axially aligning the openings of the respective pairs of the first rods and extending a pin through the openings of each of the respective pairs of the first rods.

20. The container of claim 19, wherein the pin comprises a head portion and a body portion, the body portion extending through the openings of each of the respective pairs of the first rods and the head portion abutting against one of the first rods.

21. The container of claim 19, wherein the pin is captured by one of the first rods.

22. The container of claim 18, wherein each of the tubes has four sidewalls and four corners defining a rectangular cross section, the recesses being formed along at least one of the corners of the tubes and the first rods being mounted in the plurality of recesses along the at least one of the corners of the tubes.

23. The container of claim 22, wherein the tubes are arranged in an alternating pattern and the tubes are linked together at the corners, wherein a first one of the side walls of the first one of the tubes is substantially aligned with a first one of the side walls of the second one of the tubes, and a second one of the side walls of the first one of the tubes is substantially aligned with a second one of the side walls of the second one of the tubes.

24. The container of claim 18, further comprising at least one second rod being mounted in the recesses of respective ones of the tubes, the at least one second rod mounted in the recess of a respective one of the tubes engaging the recess of a remaining one of tubes when the tubes are linked together.

25. The container of claim 24, wherein the plurality of tubes comprises a first set of tubes and a second set of tubes, wherein the second rods are mounted in each one of the tubes in the second set of tubes.

26. The container of claim 23, wherein the plurality of tubes is arranged in the alternating pattern such that the placement of a four-tube array linked at the corners of the tubes creates a developed cell.

27. The container of claim 22, wherein respective ones of the tubes includes a plurality of flat load bearing surfaces at the corners of the tubes, the plurality of flat load bearing surfaces on a respective one of the tubes engaging the flat bearing surfaces on a remaining one of the tubes.

28. A container for storing or transporting spent nuclear fuel, the container comprising:

a plurality of tubes that receive spent nuclear fuel rods, each of the tubes having four sidewalls forming a continuous inner sidewall and four corners defining a rectangular cross section, each of the tubes having a plurality of recesses along at least one of the corners and a plurality of flat load bearing surfaces along at least one of the corners;

a plurality of first rods being mounted in the recesses of the tubes, wherein respective pairs of the first rods are attached to each other, thereby linking the tubes together, and each of the first rods is seated in the recesses of two of the tubes, wherein each of the rods comprises at least one outer wall, the at least one outer wall of each of the rods contacting the recesses of two of the tubes; and

wherein the tubes are linked to each other at the corners such that the flat load bearing surfaces on respective pairs of the tubes abut against each other.

29. The container of claim 28, wherein each of the first rods includes an opening, wherein the openings of respective pairs of the first rods of adjacent ones of the tubes are

aligned so that a pin may be extended therethrough, thereby attaching the respective pairs of the first rods together.

30. The container of claim 29, wherein the one or more pins comprise a head portion and a body portion, the body portion extending through the openings of the aligned first rods of adjacent tubes and the head portion being adjacent to one first rod of the plurality of first rods.

31. The container of claim 28, further comprising at least one second rod being mounted in the recesses of a respective one of the tubes and engaging the recesses of an adjacent one of the tubes when the tubes are linked together.

32. The container of claim 31, further comprising a first set of the tubes and a second set of the tubes, wherein the second rods are mounted in each one of the first set of tubes.

33. The container of claim 28, wherein the plurality of tubes is arranged in the alternating pattern such that the placement of a four-tube array linked at the corners of the tubes creates a developed cell.

34. The container of claim 29, wherein the pin is captured by one of the first rods.

35-47. (Canceled)

48. An apparatus for the storage and transport of spent nuclear fuel, comprising:

an array of tubes having a continuous inner sidewall;

a container, wherein the array of tubes are disposed in the container and the array of tubes contacts at least one side wall of the container;

a plurality of couplings between adjacent pairs of the tubes, wherein each of the couplings comprises:

a first rod disposed on a first one of the tubes;

a second rod attached to a second one of the tubes;

the first rod being disposed in recesses formed in the outer surfaces of both the first and second ones of the tubes, and the second rod being disposed in the recesses formed in the outer surfaces of both the first and second ones of the tubes, wherein each of the first and second rods comprises at least one outer wall, the at least one outer wall of each of the first and second rods contacting the recesses formed in the outer surfaces of both the first and second ones of the tubes;

the first and second rods each having an opening along a length of the first and second rods; and

a pin extending through the openings of the first and second rods; and

wherein a horizontal bearing load applied to the array of tubes is transferred through the tubes and the couplings to the at least one side wall of the container.

49. The apparatus of claim 48, wherein each of the tubes further comprises a plurality of side walls, wherein at least one of the side walls of a respective one of the tubes and a side wall of a second one of the tubes are in substantial alignment.

50. The apparatus of claim 48, wherein each of the tubes in the adjacent pairs of tubes further comprise at least two side walls joined along a corner, and, a flat bearing surface disposed in at least a portion of the corner, wherein for each of the adjacent pairs of tubes, a first one of the flat bearing surfaces contacts a second one of the flat bearing surfaces.

51. The apparatus of claim 48, further comprising at least one solid rod disposed between the adjacent pairs of the tubes.

52. (Canceled)

53. The apparatus of claim 48, wherein the first and second rods are welded into the recesses.

54. The apparatus of claim 48, wherein the recesses are formed in a plurality of corners in the outer surfaces of the tubes.

55. The apparatus of claim 48, wherein the pin extending through the openings of the first and second rods is rigidly attached to at least one of the first and second rods.

56. The apparatus of claim 55, wherein the pin is rigidly attached to at least one of the first and second rods by a weld, wherein the weld is positioned so as not to be subject to the horizontal bearing load.

57. The apparatus of claim 48, wherein a cross sectional shape of the tubes is selected from the group consisting of a square, a rectangle, a circle, a triangle, a hexagon, a heptagon, and an octagon.

58. The apparatus of claim 48, wherein the array of tubes forms a cell, wherein the tubes are arranged in an alternating pattern in the cell.

59-68. (Canceled)

69. An apparatus for the dry storage and transport of spent nuclear fuel, comprising:

a plurality of tubes disposed in a container, each of the plurality of tubes having a continuous inner sidewall;

a plurality of recesses, each recess being formed in a wall of a respective one of the tubes;

a plurality of rods, each rod being disposed within a first one of the recesses formed in a first one of the tubes;

each of the rods has an outer wall that contacts a second one of recesses formed in a second one of the tubes when the tubes are assembled in the container; and

each of the recesses being configured to receive the rod from a lateral direction with respect to a longitudinal length of a respective one of the tubes to facilitate a horizontal assembly of the tubes to each other.

70. The apparatus of claim 69, further comprising:

respective ones of the rods being attached to corresponding ones of the recesses;

a plurality of pins; and

where the respective ones of the rods further comprise a socket to receive one of the pins.

71. The apparatus of claim 71, further comprising each of the pins being disposed into a pair of the sockets to connect a respective pair of the tubes.

VIII. EVIDENCE – APPENDIX

1. Exhibit A – Declaration of Charles Pennington
2. Exhibit B – Second Declaration of Charles Pennington
3. Exhibit C – Third Declaration of Charles Pennington

IX. RELATED PROCEEDINGS – APPENDIX

None.

EXHIBIT A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	Confirmation No.: 2091
Carver et al.	Group Art Unit: 3663
Serial No.: 10/795,879	Examiner: Dudnikov, Vadim
Filed: March 8, 2004	Docket Number: 61404-1100

For: **CONTAINER AND METHOD FOR STORING OR TRANSPORTING SPENT NUCLEAR FUEL**

DECLARATION OF CHARLES PENNINGTON UNDER 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I possess an undergraduate degree in mathematics from Duke University, and an M.S. in Nuclear Engineering from North Carolina State University. I have been associated with the nuclear energy industry, both commercial and military, for 40 years. In that time, I have authored at least 50 articles and presentations for various publications and organizations relating to the storage of spent nuclear fuel and other topics relating to nuclear energy.

2. I am currently Vice President of Marketing and Business Development for NAC International, a U.S. company with a significant leadership role in the United States for the storage and transportation of spent nuclear fuel. I have also served for five years as the Director of the Nuclear Spent Fuel Academy sponsored by NAC International

which is a one-week colloquium on spent nuclear fuel storage and transport offered to industry, academia, and government.

3. I am named an inventor of patents relating to spent nuclear fuel storage and transport technology involving neutron absorbers for criticality control and special canister system designs for spent fuel storage and transport, including methods for heat removal from exothermic materials. I have served as a consultant to the International Atomic Energy Agency relating to casks for spent nuclear fuel and have served as an expert witness for several utility companies supporting their Federal licensing, state approval, and litigation activities relating to spent nuclear fuel transport and storage. I have provided both closed-door and public presentations to the National Academy of Sciences and the Nuclear Regulatory Commission on the safety and security of the storage and transport of dry spent nuclear fuel.

4. I have previously led the Engineering and Design Services business unit within NAC for five years. This unit performs the design, Federal licensing, and implementation of storage and transportation systems for spent nuclear fuel. In this role, I directed development, design, and Federal licensing of storage and transport systems for spent nuclear fuel including the NAC-MPC®, UMS®, Advanced UMS®, and other systems.

5. Before joining NAC International, I served as Vice President for Technology and Business Development for Holtec International where I directed the development of

technology for nuclear and hazardous material storage and transport. Prior to my employment at Holtec International, I served as Vice President for Transnuclear, Inc., where I was involved in design development, fabrication assessment, commercialization, and marketing efforts for several spent nuclear fuel dual purpose metal casks, metal spent fuel storage casks, and other types of casks.

6. I have been made aware of the contents U.S. Patent Application 10/795,879 entitled "Container and Method for Storing or Transporting Spent Nuclear Fuel" (hereafter "the '879 application"). The '879 application involves the storage and transport system for spent nuclear fuel that employs so called pin and slot technology.

7. I further have been made aware of the rejection of certain claims in this patent application as being allegedly unpatentable over U.S. Patent 6,009,136 issued to Loftis *et al.* (hereafter "Loftis") in view of a so called "wooden house." I have also been made aware of the rejection of certain claims in this patent application as being allegedly unpatentable over Loftis in view of U.S. Patent 4,630,738 issued to Bosshard (hereafter "Bosshard") in view of the so called "wooden house," and further in view of U.S. Patent Application Publication 2002/0015614 A1 filed by Lindsay (hereafter "Lindsay") and a catalog of Hoover Fence Company (hereafter "Hoover"). In view of these rejections, I set forth the following information.

8. Upon initial scrutiny, one skilled in the art of storage and transportation systems for spent nuclear fuel would not think to use the design that is the subject of the '879 patent for connectivity between tubes in a spent nuclear fuel containment system basket, which holds the nuclear spent fuel. This is because, at first glance, the approach appears too simple and presents neither obvious strength of connectivity between tubes, nor sufficient heat transfer paths for very hot spent nuclear fuel. Also at first glance, the design does not appear to provide for adequate ligaments for accident condition load transmission and distribution through the structure so that both the container and the spent nuclear fuel disposed therein remain geometrically stable through the range of off-normal and hypothetical accident conditions that a system must withstand as required by applicable Federal regulations.

9. Furthermore, before invention of the subject matter of the '879 patent, one skilled in the art would have been likely to deem such a design as unworkable due to weaknesses in the design. Specifically, given that in some embodiments, the pins are not rigidly or permanently fixed in the opposing slots, there is potential for relative motion among the tubes. One would be led to assume that "pull-out" forces from accident conditions imposed on the rods would remove them from the recesses, causing unacceptable basket instability. Typically, it has long been accepted that massive structures with extensive welding and very rigid assembly represent the best approach for the basket design in storage and transport systems for spent nuclear fuel. At the time of the invention that is the subject of the '879 patent, the perceived connection "looseness"

represented a glaring weakness. In addition, at the time of the invention that is the subject of the '879 patent, the depth of the recesses appeared to be another potential weakness under compressive loading, owing to the thinning of the wall material at a naturally weak point at the corners of the tubes.

10. Designs for dry spent nuclear fuel storage and transport containers must comply with Federal regulations governing Type B transportation packages. Such systems must be designed to withstand hypothetical accident conditions, such as, for example, a 9 meter drop onto an essentially unyielding surface. Such a requirement basically means that all energy from the drop condition must be absorbed by the package or cask. In typical rail or marine size casks (about 100 tons to 125 tons), the forces imposed on the containment structure in the packaging resulting from deceleration in connection with a 9 meter free drop approach 60 "g". Thus, an imparted force from a 60 g deceleration of the containment system is typical of the design requirements for hypothetical dry storage and transport accident conditions in order to meet Federal licensing requirements.

11. The structural and mechanical engineering effort to show that dry spent fuel storage and transport systems can meet these burdensome hypothetical accident conditions requires analytical methods and skills that are far removed from log cabin (i.e., wood house) and/or fence hinge design. Log cabin and fence hinge designs cannot withstand imposed loads of even a small fraction of what must be acceptable for

spent fuel dry storage and transport systems. Furthermore, the methods and skills required for these storage and transport systems are even quite distant from the analytical methods applied to wet spent nuclear fuel storage system design. For example, analysis of dry storage and transport systems under hypothetical accident conditions employs very advanced dynamic analysis methods. These analyses require time-history assessments of loads, deformations, pin and recess relative motion, and other basket stability parameters, all in a 3-D model that can require millions of nodes. Highly advanced, non-linear dynamic analysis computer codes like LS-DYNA are used to develop sophisticated accident sequence outputs by incorporating coordinated, but separate, inputs from other codes, such as ANSYS, a code for finite element modeling. Both the LS-DYNA and ANSYS codes are used by National Aeronautic and Space Administration subcontractors for aircraft, rocket, and space shuttle design analysis and evaluation under extreme performance conditions. Thus, the design of spent nuclear fuel storage and transport systems requires highly sophisticated analysis for assessment of system performance under demanding hypothetical accident conditions.

12. As mentioned above, the above-identified Office Action rejects certain claims in view of U.S. Patent 4,630,738 issued to Bosshard in combination with other references. It should be noted that the structures described by Bosshard are for wet spent nuclear fuel storage systems. The Federal regulatory requirements regarding accident conditions and the resulting loads therefrom that must be applied to such wet storage systems are much less demanding than those imposed on Type B containers

employed for dry spent nuclear fuel storage and transport systems. This is because the most limiting accident conditions to which wet storage systems may be exposed result from seismic disturbances such as earthquakes. As a consequence, such systems are typically designed to withstand a peak acceleration/deceleration of about 1 g, which is $1/60^{th}$ of the design requirement for dry spent nuclear fuel storage and transport systems. Upon reading Bosshard, one skilled in the art will appreciate that the designs described by Bosshard are subject to such lower design requirements and that such designs may not be workable for Type B container baskets employed for dry spent nuclear fuel storage and transport systems.

I hereby declare that all statements made herein of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Charles W. Pennington

Charles W. Pennington

January 23, 2008

Date

EXHIBIT B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	Confirmation No.: 2091
Carver et al.	Group Art Unit: 3663
Serial No.: 10/795,879	Examiner: Dudnikov, Vadim
Filed: March 8, 2004	Docket Number: 61404-1100

For: **CONTAINER AND METHOD FOR STORING OR TRANSPORTING SPENT NUCLEAR FUEL**

SECOND DECLARATION OF CHARLES PENNINGTON UNDER 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I possess an undergraduate degree in mathematics from Duke University, and an M.S. in Nuclear Engineering from North Carolina State University. I also possess an MBA from the University of Connecticut. I have been associated with the nuclear energy industry, both commercial and military, for 40 years. In that time, I have authored at least 50 articles and presentations for various publications and organizations relating to the storage of spent nuclear fuel and other topics relating to nuclear energy.

2. I am currently Vice President of Marketing and Business Development for NAC International, a U.S. company with a significant leadership role in the United States for the storage and transportation of spent nuclear fuel. I have also served for five years as the Director of the Nuclear Spent Fuel Academy sponsored by NAC International

which is a one-week colloquium on spent nuclear fuel storage and transport offered to industry, academia, and government.

3. I am named an inventor of patents relating to spent nuclear fuel storage and transport technology involving neutron absorbers for criticality control and special canister system designs for spent fuel storage and transport, including methods for heat removal from exothermic materials. I have served as a consultant to the International Atomic Energy Agency relating to casks for spent nuclear fuel and have served as an expert witness for several utility companies supporting their Federal licensing, state approval, and litigation activities relating to spent nuclear fuel transport and storage. I have provided both closed-door and public presentations to the National Academy of Sciences and the Nuclear Regulatory Commission on the safety and security of the storage and transport of dry spent nuclear fuel.

4. I have previously led the Engineering and Design Services business unit within NAC for five years. This unit performs the design, Federal licensing, and implementation of storage and transportation systems for spent nuclear fuel. In this role, I directed development, design, and Federal licensing of storage and transport systems for spent nuclear fuel including the NAC-MPC®, UMS®, Advanced UMS®, and other systems.

5. Before joining NAC International, I served as Vice President for Technology and Business Development for Holtec International where I directed the development of

technology for nuclear and hazardous material storage and transport. Prior to my employment at Holtec International, I served as Vice President for Transnuclear, Inc., where I was involved in design development, fabrication assessment, commercialization, and marketing efforts for several spent nuclear fuel dual purpose metal casks, metal spent fuel storage casks, and other types of casks.

6. I have been made aware of the contents of U.S. Patent Application 10/795,879 entitled "Container and Method for Storing or Transporting Spent Nuclear Fuel" (hereafter "the '879 application"). The '879 application involves the storage and transport system fuel basket design for spent nuclear fuel that employs so called rod and recess technology.

7. I further have been made aware of the rejection of claims 1, 6 ,and 7 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent 6,009,136 issued to Loftis *et al.* (hereafter "Loftis") in view of an online catalog item of Hoover Fence Company (hereafter "Hoover"). I have also been made aware of the rejection of claims 8-10, 13-34, 48-51, and 53-58 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over Loftis in view of U.S. Patent 4,630,738 issued to Bosshard (hereafter "Bosshard") in view of U.S. Patent Application Publication 2002/0015614 A1 filed by Lindsay (hereafter "Lindsay") and further in view of Hoover. In view of these rejections, I set forth the following information.

8. The "rod and recess" technology as referred to herein involves various elements of the claims of the above-referenced patent application. For example, among other elements, at least one of the independent claims in present application includes an element in which rods are seated in the recesses of respective pairs of the tubes such that the walls of the rods contact the recesses of the tubes disposed in a container. Also, at least one independent claim further recites the feature that respective sidewalls of tubes having corners engaged with each other are in "substantial alignment." These features and other elements of at least the independent claims are features of the "rod and recess" technology that result in increased capacity for the storage of spent nuclear fuel described above. Specifically, positioning the rods in the recesses results in the fuel being stored in closer proximity, thereby increasing the amount of spent nuclear fuel that can be stored in each container. For pressurized water reactor systems, the containers that employ the "rod and recess" design falling within the scope of the claims of the above-referenced patent application as set forth above facilitate an increase of approximately 16% in the amount of spent nuclear fuel that could be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market. Similarly, for boiling water reactor systems, the containers that employ the "rod and recess" design that falls within the scope of the claims of the above-referenced patent application as set forth above provide an even greater increase of approximately 28% in the amount of spent nuclear fuel that can be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market.

9. Upon initial scrutiny, one skilled in the art of storage and transportation systems for spent nuclear fuel would not think to use the rod and recess technology that is the subject of the claims of the '879 patent for connectivity between tubes in a spent nuclear fuel containment system basket, which holds the nuclear spent fuel. This is because, at first glance, the approach appears too simple and presents neither obvious strength of connectivity between tubes, nor sufficient heat transfer paths for very hot spent nuclear fuel. Also at first glance, the design does not appear to provide for adequate mechanical ligaments for accident condition load transmission and distribution through the structure so that both the basket structure of the container and the spent nuclear fuel disposed therein remain geometrically stable through the range of off-normal and hypothetical accident conditions that a system must withstand as required by applicable Federal regulations.

10. Furthermore, before invention of the rod and recess technology that is the subject of the claims of the '879 patent, one skilled in the art would have been likely to deem such a design as unworkable due to weaknesses in the design. Specifically, given that in some embodiments, the rods are not rigidly or permanently fixed in the opposing recesses, there is potential for relative motion among the tubes. One would be led to assume that "pull-out" forces from accident conditions imposed on the rods would remove them from the recesses, causing unacceptable basket instability. Typically, it has long been accepted that fairly massive structures with extensive welding and very rigid assembly represent the best approach for the basket design in storage and transport

systems for spent nuclear fuel. At the time of the invention of the rod and recess technology that is the subject of the claims of the '879 patent, the perceived connection "looseness" represented a glaring weakness. In addition, at the time of the invention of the rod and recess technology, the depth of the recesses appeared to be another potential weakness under compressive loading, owing to the thinning of the wall material at a naturally weak point at the corners of the tubes.

11. Designs for dry spent nuclear fuel storage and transport containers must comply with Federal regulations governing Type B transportation packages. Such systems must be designed to withstand hypothetical accident conditions, such as, for example, a 9 meter drop onto an essentially unyielding surface. Such a requirement basically means that all energy from the drop condition must be absorbed by the package or cask. In typical rail or marine size casks (about 100 tons to 125 tons), the forces imposed on the containment structure in the packaging resulting from deceleration in connection with a 9 meter free drop approach 60 "g". Thus, an imparted force from a 60 g deceleration of the containment system is typical of the design requirements for hypothetical dry storage and transport accident conditions in order to meet Federal licensing requirements.

12. The structural and mechanical engineering effort to show that dry spent fuel storage and transport systems can meet these burdensome hypothetical accident conditions requires analytical methods and skills that are far removed from log cabin

(i.e., wood house), trailer hitch, and/or fence hinge design. Log cabin, trailer hitch, and fence hinge designs cannot withstand imposed loads of even a small fraction of what must be acceptable for spent fuel dry storage and transport systems. Furthermore, the methods and skills required for these storage and transport systems are even quite distant from the analytical methods applied to wet spent nuclear fuel storage system design. For example, analysis of dry storage and transport systems under hypothetical accident conditions employs very advanced dynamic analysis methods. These analyses require time-history assessments of loads, deformations, rod and recess relative motion, and other basket stability parameters, all in a 3-D model that can require millions of nodes. Highly advanced, non-linear dynamic analysis computer codes like LS-DYNA are used to develop sophisticated accident sequence outputs by incorporating coordinated, but separate, inputs from other codes, such as ANSYS, a code for finite element modeling. Both the LS-DYNA and ANSYS codes are used by National Aeronautic and Space Administration subcontractors for aircraft, rocket, and space shuttle design analysis and evaluation under extreme performance conditions. Thus, the design of spent nuclear fuel storage and transport systems requires highly sophisticated analysis for assessment of system performance under demanding hypothetical accident conditions. These analysis methods have been used to show that this "rod and recess" technology, the subject of this application, is able to meet regulatory requirements for spent nuclear fuel transport and storage containers.

13. As mentioned above, the above-identified Office Action rejects certain claims in view of U.S. Patent 4,630,738 issued to Bosshard in combination with other references. It should be noted that the structures described by Bosshard are for wet spent nuclear fuel storage systems. The Federal regulatory requirements regarding accident conditions and the resulting loads therefrom that must be applied to such wet storage systems are much less demanding than those imposed on Type B containers employed for dry spent nuclear fuel storage and transport systems. This is because the most limiting accident conditions to which wet storage systems may be exposed result from seismic disturbances such as earthquakes. As a consequence, such systems are typically designed to withstand a peak acceleration/deceleration of about 1 g, which is $1/60^{th}$ of the design requirement for dry spent nuclear fuel storage and transport systems. Upon reading Bosshard, one skilled in the art will appreciate that the designs described by Bosshard are subject to such lower design requirements and that such designs may not be workable for Type B container baskets employed for dry spent nuclear fuel storage and transport systems.

I hereby declare that all statements made herein of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Charles W. Pennington

Charles W. Pennington

August 26, 2008

Date

EXHIBIT C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	Confirmation No.: 2091
Carver et al.	Group Art Unit: 3663
Serial No.: 10/795,879	Examiner: Dudnikov, Vadim
Filed: March 8, 2004	Docket Number: 61404-1100

For: **CONTAINER AND METHOD FOR STORING OR TRANSPORTING SPENT NUCLEAR FUEL**

THIRD DECLARATION OF CHARLES PENNINGTON UNDER 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I possess an undergraduate degree in mathematics from Duke University, and an M.S. in Nuclear Engineering from North Carolina State University. I also possess an MBA from the University of Connecticut. I have been associated with the nuclear energy industry, both commercial and military, for 40 years. In that time, I have authored at least 50 articles and presentations for various publications and organizations relating to the storage of spent nuclear fuel and other topics relating to nuclear energy.

2. I am currently Vice President of Marketing and Business Development for NAC International, a U.S. company with a significant leadership role in the United States for the storage and transportation of spent nuclear fuel. I have also served for five years as the Director of the Nuclear Spent Fuel Academy sponsored by NAC International which is a one-week colloquium on spent nuclear fuel storage and transport offered to industry, academia, and government.

3. I am named an inventor of patents relating to spent nuclear fuel storage and transport technology involving neutron absorbers for criticality control and special canister system designs for spent fuel storage and transport, including methods for heat removal from exothermic materials. I have served as a consultant to the International Atomic Energy Agency relating to casks for spent nuclear fuel and have served as an expert witness for several utility companies supporting their Federal licensing, state approval, and litigation activities relating to spent nuclear fuel transport and storage. I have provided both closed-door and public presentations to the National Academy of Sciences and the Nuclear Regulatory Commission on the safety and security of the storage and transport of dry spent nuclear fuel.

4. I have previously led the Engineering and Design Services business unit within NAC for five years. This unit performs the design, Federal licensing, and implementation of storage and transportation systems for spent nuclear fuel. In this role, I directed development, design, and Federal licensing of storage and transport systems for spent nuclear fuel including the NAC-MPC®, UMS®, Advanced UMS®, and other systems.

5. Before joining NAC International, I served as Vice President for Technology and Business Development for Holtec International where I directed the development of technology for nuclear and hazardous material storage and transport. Prior to my employment at Holtec International, I served as Vice President for Transnuclear, Inc., where I was involved in design development, fabrication assessment, commercialization,

and marketing efforts for several spent nuclear fuel dual purpose metal casks, metal spent fuel storage casks, and other types of casks.

6. I have been made aware of the contents of U.S. Patent Application 10/795,879 entitled "Container and Method for Storing or Transporting Spent Nuclear Fuel" (hereafter "the '879 application"). The '879 application involves a storage and transport system fuel basket design for spent nuclear fuel that employs "rod and recess" technology.

7. I further have been made aware of the rejection of claims 1, 6 ,and 7 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent 6,009,136 issued to Loftis *et al.* (hereafter "Loftis") in view of an online catalog item of Hoover Fence Company (hereafter "Hoover"). I have also been made aware of the rejection of claims 8-10, 13-34, 48-51, and 53-58 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over Loftis in view of U.S. Patent 4,630,738 issued to Bosshard (hereafter "Bosshard") in view of U.S. Patent Application Publication 2002/0015614 A1 filed by Lindsay (hereafter "Lindsay") and further in view of Hoover. In light of these rejections, I am providing the following information.

8. The "rod and recess" technology as referred to herein involves various elements of the claims of the above-referenced patent application. For example, among other elements, at least one of the independent claims in the present application includes an element in which rods are seated in the recesses of respective pairs of the tubes such

that the walls of the rods contact the recesses of the tubes disposed in a container. Also, at least one independent claim further recites the feature that respective sidewalls of tubes having corners engaged with each other are in "substantial alignment." These features and other elements of at least the independent claims are features of the "rod and recess" technology that result in increased capacity for the storage of spent nuclear fuel described above. Specifically, positioning the rods in the recesses results in the spent nuclear fuel being stored in closer proximity, thereby increasing the amount of spent nuclear fuel that can be stored in each container. For pressurized water reactor systems, the containers that employ the "rod and recess" design falling within the scope of the claims of the above-referenced patent application as set forth above facilitate an increase of approximately 16% in the amount of spent nuclear fuel that could be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market. Similarly, for boiling water reactor systems, the containers that employ the "rod and recess" design that falls within the scope of the claims of the above-referenced patent application as set forth above provide an even greater increase of approximately 28% in the amount of spent nuclear fuel that can be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market.

9. The dry storage of spent nuclear fuel usually involves placing nuclear fuel within a basket structure inside a container or canister that in turn is placed in a storage cask. The container is typically made out of metal, and the storage cask may be constructed from metal or concrete.

10. Even though containers employing the "rod and recess" technology as set forth in the claims of the above-referenced patent application hold significantly greater amounts of spent nuclear fuel, the containers can still fit within casks having the same outer dimensions as were used for the previously existing container designs. By virtue of the increased amounts of spent nuclear fuel that could be stored within the same area at a storage facility using baskets in containers employing the "rod and recess" technology, many millions of dollars could be saved by a major nuclear utility over the life of the dry storage systems if containers employing the "rod and recess" technology are used.

11. The market for systems that are licensed for both spent fuel storage and transport was primarily established from 1995 to 2000 as the United States Department of Energy (DOE) endorsed such dual use canister systems and major nuclear utilities began to employ dry storage systems for the storage of spent nuclear fuel on a large scale. Between 1995 to 2000, there were a small number of different dry storage systems available, but few if any had obtained dual use certification from the Nuclear Regulatory Commission (NRC).

12. Between 2000 and 2002, several dual use dry storage system designs were certified for storage by the NRC, having received a Certificate of Compliance issued under the General Licensing provisions of 10 CFR part 72 by the NRC. Thus, after about 2002, major nuclear utilities could purchase either certified systems or uncertified systems that were still in the NRC review process. To the best of my knowledge, no major nuclear

utility purchased an uncertified dual use system after certified systems were available in the post-2002 period.

13. When dry storage systems were first embraced by the nuclear power industry, it was felt that such systems could provide a temporary holding capacity for spent nuclear fuel before it was permanently disposed of in a repository facility at Yucca Mountain in Nevada. It has now become apparent that dry storage systems will be needed for potentially two or more additional decades given what appears to be a slow pace by the DOE to license the Yucca Mountain site for disposal of spent nuclear fuel. Consequently, the benefit of increased storage capacity of the containers due to the use of the "rod and recess" technology as set forth in the claims of the above-referenced patent application has become even more attractive for major nuclear utilities.

14. On August 31, 2006, NAC received a request for proposal (RFP) from a customer that is a major nuclear utility operating multiple nuclear power plants. As set forth in this request for proposal, this customer sought to increase the efficiency of its existing dry storage or spent nuclear fuel. This customer was using an older dry storage system that had a lesser efficiency and they sought to store more nuclear fuel in a smaller number of containers and casks on their storage pad. Essentially, they wished to reduce the number of storage casks on a given storage pad while, at the same time, storing the same amount of spent nuclear fuel, thereby creating more efficient spent fuel storage capacity for future storage of additional spent nuclear fuel. Ultimately, this meant storing more spent nuclear fuel in each container used in the storage system. This customer wished to purchase a new dry storage system that provided the desired greater efficiency.

15. NAC submitted a bid to the customer to supply containers to store dry nuclear fuel that employed the claimed "rod and recess" technology that facilitates storage of greater amounts of spent nuclear fuel by 16% for this customer that operated a pressurized water reactor system as described above. At the time the bid was submitted, NAC had not yet received certification of the container design employing the "rod and recess" technology from the NRC.

16. Due to the fact that the NAC containers employing the "rod and recess" technology offered such pronounced savings in dollars per spent nuclear fuel assembly stored due to the increased storage capacity for spent nuclear fuel, the customer signed a contract with NAC for the purchase of containers employing the "rod and recess" design before certification was received from the NRC. From an industry perspective, this action represents a significant leap of faith recognizing the superiority of the design of the containers employing the "rod and recess" technology. The increased storage capacity of the containers brought about due to the features set forth as elements of the claims of the above-referenced patent application was a deciding factor in the decision to sign the contract for the purchase of the containers.

I hereby declare that all statements made herein of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Charles W. Pennington

Charles W. Pennington

August 26, 2008

Date